Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

10/534,632

Page

2

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the present application:

1 (currently amended): An imaging system for a vehicle, said imaging system comprising:

a camera module positionable configured for mounting at the <u>a</u> vehicle, said camera module comprising a plastic housing and an imaging sensor having a lens and a pixelated imaging array, said plastic housing including a <u>first-connector</u> portion and a <u>second-camera</u> portion, <u>wherein said first-connector</u> portion and said <u>second-camera</u> portion <u>being one of are</u> laser welded <u>and sonic welded-together to form a substantially hermetic seal-said-imaging sensor and associated components within said plastic housing;</u>

wherein said camera module comprises a self-contained camera module with said imaging sensor and associated components substantially sealed to limit or substantially preclude water intrusion into within said plastic housing, and wherein said camera module is configured to be positioned at the vehicle as a unit;

wherein said <u>connector portion of said</u> camera module comprises an electrical connector <u>suitable for electrically conductive connection</u> that is electrically connected to a vehicle electrical connector when said camera module is positioned at the vehicle;

wherein said <u>imaging sensor</u> is disposed at a first substrate and wherein said electrical <u>connector</u> is disposed at a second substrate, and wherein said electrical connector is electrically <u>conductively connected to circuitry of said imaging sensor at said first substrate via a flexible <u>connector</u> first portion of said camera module comprises a connector portion and includes said electrical connector at an end thereof and said second portion of said camera module comprises a camera portion and includes a transparent cover portion at or near an end of said lens for receiving an image therethrough;</u>

wherein said first substrate is attached at said camera portion and said second substrate is attached at said connector portion such that said first and second substrates are disposed within

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Scrial No.

: 10/534,632

Page

3

said plastic housing with said imaging sensor having a field of view through a portion of said camera portion;

wherein said electrical connector extends from said second substrate through said connector portion so as to be accessible at an end of said connector portion for connecting to the vehicle electrical connector when said camera module is positioned at the vehicle; and a control operable to process video images captured by said imaging sensor.

2-4 (canceled).

- 5 (currently amended): The imaging system of claim 4, claim 1, wherein said camera portion of said camera module includes a transparent cover portion at or near an end of said lens for receiving an image therethrough, and wherein said transparent cover is one of laser welded and sonic welded to said camera portion.
- 6 (previously presented): The imaging system of claim 1, wherein said camera module is positioned in a movable housing that is movable relative to an exterior portion of the vehicle to move said imaging sensor between a stored position generally within the portion of the vehicle and an operational position where said imaging sensor is positioned to have a field of view exteriorly of the vehicle.
- 7 (previously presented): The imaging system of claim 6, wherein said movable housing comprises a transparent panel, said transparent panel being positioned at least partially across an opening of said housing and generally in the field of view of said imaging sensor.
- 8 (previously presented): The imaging system of claim 7, wherein said movable housing comprises a panel cleaning device positionable at the exterior portion of the vehicle and configured to engage an exterior surface of said transparent panel to clean said transparent panel

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

: 10/534,632

Page

4

as said housing moves said imaging sensor between said stored position and said operational position.

9 (previously presented): The imaging system of claim 7, wherein said housing is configured to receive an illumination source, said illumination source being directable toward the exterior scene when said housing moves said imaging sensor to said operational position.

10-11 (canceled).

12 (previously presented): The imaging system of claim 1 including at least one illumination source, said control being operable to selectively activate said at least one illumination source in response to a detected ambient light level.

13-14 (canceled).

15 (previously presented): The imaging system of claim 1, wherein said control is operable to selectively switch said imaging sensor from a color mode to a black and white mode.

16 (previously presented): An imaging system for a vehicle, said imaging system comprising:

a camera module positionable at the vehicle, said camera module comprising a plastic
housing and an imaging sensor, said plastic housing including a first portion and a second
portion, said first portion and said second portion being one of laser welded and sonic welded
together to substantially seal said imaging sensor and associated components within said plastic
housing, wherein said housing includes a ventilation portion, said ventilation portion being at
least partially permeable to water vapor to allow water vapor to pass therethrough while
substantially precluding passage of at least one of water droplets and contaminants; and
a control operable to process images captured by said imaging sensor.

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

: 10/534,632

Page

: 5

17-33 (canceled).

34 (currently amended): The imaging system of claim 31 49, wherein said housing moves said imaging device to said operational position in response to engagement of a reverse gear of the vehicle.

35 (currently amended): The imaging system of claim 31-49 including a spraying device operable to spray fluid onto said transparent panel.

36 (currently amended): The imaging system of claim 31-49 including an illumination source that is selectively operable to illuminate the exterior scene.

37 (original): The imaging system of claim 36, wherein said housing is configured to receive said illumination source, said illumination source being directable toward the exterior scene when said housing moves said imaging device to said operational position.

38-39 (canceled).

40 (previously presented): The imaging system of claim 37, wherein said control is operable to selectively activate said illumination source and said imaging device when said imaging device is moved to said stored position to determine if moisture is present on said transparent panel.

41 (previously presented): The imaging system of claim 36, wherein said control is operable to selectively activate said illumination source in response to at least one of (a) said imaging device being in said operational position and (b) a detected ambient light level.

42-47 (canceled).

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

10/534,632

Page

: 6

48 (currently amended): The imaging system of claim 47 49, wherein said control is operable to determine a distance to at least one object in response to processing of images captured by said imaging device when in said first and second operational positions.

49 (previously presented): An imaging system of a vehicle, said imaging system comprising: an imaging device operable to capture images of a scene occurring exteriorly of the vehicle;

a holding device for movably holding said imaging device, said holding device comprising a housing, a transparent panel and a panel cleaning device, said housing being movably mountable at an exterior portion of a vehicle, said imaging device being positioned within said housing, said transparent panel being positioned at least partially across an opening of said housing and generally in the field of view of said imaging device, said housing being movable relative to the exterior portion of the vehicle to move said imaging device between a stored position, where said imaging device is positioned generally within the portion of the vehicle, and an operational position, where said imaging device is positioned to have a field of view exteriorly of the vehicle, said panel cleaning device being positionable at the exterior portion of the vehicle and configured to engage an exterior surface of said transparent panel to clean said transparent panel as said housing moves said imaging device between said stored position and said operational position;

a control operable to process images captured by said imaging device; and wherein said housing is movable to selectively position said imaging device in first and second operational positions, and wherein said control is operable to selectively move said housing to position said imaging device at said first operational position in response to the vehicle making an initial approach to a target zone and to position said imaging device at said second operational position in response to the vehicle moving further into the target zone, said imaging device being directed more downward when in said second operational position relative to said first operational position.

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

: 10/534,632

Page

7

50-65 (canceled).

66 (new): An imaging system for a vehicle, said imaging system comprising:

a camera module configured for mounting at a vehicle as a unit;

wherein said camera module comprises a plastic housing;

wherein said plastic housing comprises a first molded plastic housing portion and a second molded plastic housing portion, and wherein said first and second housing portions comprise respective first and second mating portions;

wherein said mating portions of said first and second housing portions are laser welded together forming a hermetic seal therebetween in order to substantially preclude water intrusion into said plastic housing therethrough; and

wherein said plastic housing accommodates a pixelated imaging array therein.

67 (new): The imaging system of claim 66, wherein said plastic housing accommodates a lens system.

68 (new): The imaging system of claim 67, wherein said first housing portion comprises a generally cylindrical portion that at least partially accommodates said lens system.

69 (new): The imaging system of claim 68, wherein said first housing portion at least partially encases said pixelated imaging array.

70 (new): The imaging system of claim 68, wherein said first housing portion of said camera module includes a transparent cover portion at or near an end of said generally cylindrical portion, and wherein said transparent cover is laser welded to said first housing portion.

71 (new): The imaging system of claim 70, further comprising a heating element at said transparent cover for heating said transparent cover.

Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No.

: 10/534,632

Page

8

72 (new): The imaging system of claim 68, wherein said second housing portion of said camera module comprises an electrical connector that is accessible at an exterior portion of said second housing portion and that is suitable for electrically conductive connection to a vehicle electrical connector when said camera module is positioned at the vehicle.

73 (new): The imaging system of claim 66, further comprising heating means.

74 (new): The imaging system of claim 73, wherein said heating means comprises lens heating means.

75 (new): The imaging system of claim 66, further comprising at least one illumination source, said control being operable to selectively activate said at least one illumination source in response to a detected ambient light level.

76 (new): The imaging system of claim 66, further comprising a control operable to process video images captured by said pixelated imaging array.

77 (new): An imaging system for a vehicle, said imaging system comprising: a camera module configured for mounting at a vehicle as a unit; wherein said camera module comprises a plastic housing;

wherein said plastic housing comprises a first molded plastic housing portion and a second molded plastic housing portion, and wherein said first and second housing portions comprise respective first and second mating portions;

wherein said mating portions of said first and second housing portions are laser welded together forming a hermetic seal therebetween in order to substantially preclude water intrusion into said plastic housing therethrough;

wherein said plastic housing accommodates a pixelated imaging array therein;

Applicants : Robert L. Bingle, Joseph Camilleri, Peter J. Whitehead and Kenneth Schofield

Serial No. : 10/534,632

Page: 9

wherein said first housing portion comprises a generally cylindrical portion that at least partially accommodates a lens system; and

wherein said second housing portion comprises an electrical connector suitable for electrically conductive connection to a vehicle electrical connector when said camera module is positioned at the vehicle.

78 (new): The imaging system of claim 77, wherein said first housing portion at least partially encases said pixelated imaging array.

79 (new): The imaging system of claim 77, further comprising heating means.

80 (new): The imaging system of claim 79, wherein said heating means comprises lens heating means.